Discovering User Connections using Their Shared Images on Social Media

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Abstract—Many social media applications, such as recommendation, virality prediction and marketing, make use of social graphs, which may not be explicitly specified or kept privately. Meanwhile, advanced mobile devices have become part of our live and a huge amount of user shared images is being generated every day. Obtaining user connection is hence possible by analyzing those images, in which one of the most common approaches is using user annotated tags which are not always reliable. This video demonstrates how non-user generated annotation with non-user generated labels helps the connection discovery by enhancing the quality of the annotation with computer vision techniques. Users are represented by the occurrences of each unique non-user generated labels and connections are then discovered from these occurrences. The discovered connections are useful for information or service recommendations in any social network with image sharing, are other interesting personalization applications, even without access to social graphs.

Extended Abstract

Billions of user shared images in social media are seamlessly generated by individuals everyday, and this form of user shared content is widely accessible by others due to its intrinsic nature for social sharing. User social graphs, the complete friendships among users on those social media, are accessible under exclusive conditions or by certain organizations like Facebook. Using user shared images is proved in this research as an effective alternative to improve the service relevance for a user to the common approach in many social networks today of using user annotated tags [1]. This video demonstrates how non-user generated annotation with non-user generated labels helps the connection discovery by enhancing the quality of the annotation with computer vision techniques. Users are represented by the occurrences of each unique non-user generated labels and connections are then discovered from these occurrences. The discovered connections are useful for information or service recommendations in any social network with image sharing, are other interesting personalization applications, even without access to social graphs. These works can be useful to existing social networks and online services that enables the design of novel techniques to understand user interests and making product recommendations, and for creating many interesting mobile photo applications, even without the access to user social graphs from exclusive sources. For example, gender identification, tie nature prediction and community prediction are possible with the discovered connections.

The user shared images are analyzed using signal processing approaches, such as BoFT [1] that uses a common computer vision technique, BoF (Bag-of-Features), or supervised classification approaches such as support vector machines to represent each image with non-user generated labels. Two images with the same non-user generated labels indicate that they are visually similar, such as the object appears on both images. The proposed method uses the number of occurrences of the non-user generated labels of the shared images of a user as his/her user profile. A user i is represented by his/her user profile, L_i, and the distribution of the non-user generated labels. When the user profile of each user is established, the next step is the connection discovery based on the similarity, $S_{i,j}$, of users i and j, in which users who share highly similar images will have a high similarity. This requires a pairwise similarity comparison among user profiles based on the number of occurrences of labels, and this is calculated using the following formula:

$$S_{i,j} = S(L_i, L_j) = \frac{L_i \cdot L_j}{||L_i|| \cdot ||L_j||} \qquad (1)$$

where L_i and L_j are the set of BoFT labels of the shared image in the user profiles of users i and j respectively.

This research enables many applications, even without the access of social graph or personal information. In social networks such as WeChat and Instagram, user shared images are widely accessible but the social graph and user profile are only available to approved groups of people. Even for social network with information provided by users, the information may not be a completed one that user profile information such as location and community could be missing. This limits the effectiveness of applications, such as targeted marketing. Using user shared images is proved in this research as an effective alternative to improve the service relevance.

Acknowledgment

References

[1] M. Cheung and J. She. "Bag-of-features tagging approach for a better recommendation with social big data." in Proceedings of the 5th International Conference on Advances in Information Mining and Management. (2014).